computer readable code for selecting one or more algorithms from the different algorithms of each selected processor and configuring each selected processor with its selected one or more algorithms;;

computer readable code for analyzing each image portion for defects within the selected processor based on the selected one or more algorithms for such selected processor;

A6

computer readable code for outputting and combining results from each processor such that defect data is compiled for the entire image data; and

a computer readable medium for storing the computer readable codes.

REMARKS

Claims 1, 11, 18, 24, 34, and 39 been amended. Claims 1-47 remain pending.

The Examiner rejected claims 1, 3-9, 24, 25, 27-30, 39, and 41-44 under 35 U.S.C. §102(b) as being anticipated by Forslund (U.S. patent 5,659,630). The Examiner has also rejected claim 10 under 35 U.S.C. §103(a) as being unpatentable over Forslund in view of Garza et al. (US 6,081,659). Claims 11-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund in view of Pial et al. (US 5,357,632). Claims 18, 19, 22, 23, 34, 37, and 38 are rejected under 35 U.S.C. §103(a) as being unpatentable over Forslund. Additionally, claims 20 and 35 are rejected under under 35 U.S.C. §103(a) as being unpatentable over Forslund in view of Kober (4,181,936). Claims 21, 26, 36, and 40 are rejected under under 35 U.S.C. §103(a) as being unpatentable over Forslund in view of Schmuter (4,999,785). Claims 31-33 and 45-47 are rejected under under 35 U.S.C. §103(a) as being unpatentable over Forslund in view of McCubbrey (4,484,394). The Examiner's rejections are respectfully traversed as follows.

Claim 1 is generally directed towards an "apparatus for analyzing a plurality of image portions of at least a region of a sample." Claim 1 also requires "a plurality of processors arranged to receive and analyze at least one of the image portions" where "the processors [are] arranged to operate in parallel and [are] configurable to implement one or more algorithms from a plurality of different algorithms for analyzing the image portions selected." Claim 1 also requires "a data distribution system arranged to receive image data, select at least a first processor for receiving a first image portion of the image data and one or more first algorithms selected from the plurality of different algorithms, select at least a second processor for receiving a second image portion of the image data and one or more second algorithms selected from the plurality of different algorithms, output the first image portion to the first processor and the

second image portion to the second selected processor, and configure the first processor with the one or more first algorithms and the second processor with the one or more selected algorithms." In other words, the present invention includes parallel processors which are configurable with different algorithms for processing images and a mechanism for configuring such processor with one or more selected algorithms. These features provide great flexibility in the processing of images. For example, two different images may be differently processed "on the fly" in parallel by two different processors configured with two different algorithm sets.

Independent claim 11 is directed towards an "apparatus for inspecting a plurality of image portions of at least a region of a sample." Claim 11 requires "a plurality of distributors arranged to receive the image portions" and "a plurality of processors that are arranged into a plurality of subgroups that are each coupled to an associated distributor." Claim 11 also require that "each processor [is] configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions, each distributor [is] configurable to select one or more algorithms selected from the plurality of different algorithms, output selected image portions to its associated subgroup of processors, and configure its associated processor with its selected one or more algorithms, at least two of the processors [are] arranged to analyze at least two of the image portions in parallel."

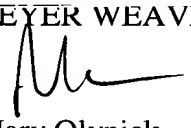
Independent claim 18 is directed towards a method and requires "receiving data derived from the inspection in a multiprocessor system" and "the system comprising a master processor and a plurality of slave processors," where "each slave processor is configurable to implement one or more algorithms selected from a plurality of different algorithms." Claim 18 also recites "selecting one or more algorithms from the plurality of different algorithms for each slave processor and configuring each slave processor with the selected one or more algorithms for such each slave processor" and then "processing the data groups with the slave processors based on the selected one or more algorithms for each slave processor." Claim 24 is also a method claim and requires "outputting each image portion to a selected processor, at least some of the image portions going to different processors" where "each being configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions." Claim 24 also requires "selecting one or more algorithms from the different algorithms of each selected processor and configuring each selected processor with its selected one or more algorithms." Claim 24 also requires "analyzing each image portion for defects within the selected processor based on the selected one or more algorithms for such selected processor." Claims 34 and 39 are directed towards computer readable medium and have limitations similar to method claims 18 and 24, respectively.

In contrast, the primary reference Forslund discloses a fixed system for processing images using fixed algorithms or procedures on the processed images. Specifically, Forslund discloses fixed parallel circuits for processing different types of defects, such as shorts and open. See Figures 12 and 15 which illustrate fixed hard-wired implementations of the short and open defect circuits, respectively. Forslund fails to teach or suggest parallel processors which are *configurable* with *different* algorithms, in the manner claimed. Accordingly, Forslund also fails to teach or suggest a mechanism for *configuring* such parallel processors with a selected algorithm, in the manner claimed. Accordingly, it is submitted that claims 1, 11, 18, 24, 34, and 39 are patentable over the Forslund reference. The secondary references also fails to teach or suggest such limitation.

The Examiner's rejections of the dependent claims are also respectfully traversed. However, to expedite prosecution, all of these claims will not be argued separately. Claims 2-10, 12-17, 19-23, 25-33, and 40-47 each depend directly from independent claims 1, 11, 18, 24, 34, or 39 and, therefore, are respectfully submitted to be patentable over cited art for at least the reasons set forth above with respect to claims 1, 11, 18, 24, 34, and 39. Further, the dependent claims require additional elements that when considered in context of the claimed inventions further patentably distinguish the invention from the cited art.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
BEYER WEAVER & THOMAS, LLP



Mary Olynick
Reg. 42,963

P.O. Box 778
Berkeley, CA 94704-0778
(510) 843-6200

APPENDIX:
MARKED UP VERSION OF CLAIM AMENDMENTS

Claims 1, 11, 18, 24, 34, and 39 have been amended as follows. All pending clams including the unamended claims are reproduced below for the Examiner's convenience.

1. (Amended Once) An apparatus for analyzing a plurality of image portions of at least a region of a sample, the apparatus comprising:

a plurality of processors arranged to receive and analyze at least one of the image portions, the processors being arranged to operate in parallel and being configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions; and

a data distribution system arranged to receive image data, select at least a first processor for receiving a first image portion of the image data and one or more first algorithms selected from the plurality of different algorithms, select at least a second processor for receiving a second image portion of the image data and one or more second algorithms selected from the plurality of different algorithms, [and] output the first image portion to the first processor and the second image portion[s] to the[ir] second selected processor[s], and configure the first processor with the one or more first algorithms and the second processor with the one or more selected algorithms.

2. An apparatus as recited in claim 1, wherein the data distribution system is further arranged to divide the image data into a plurality of image portions.

3. An apparatus as recited in claim 1, wherein the first processor is arranged to receive a first reference image portion corresponding to the first image portion and to compare the first image portion to the first reference image portion, and the second processor is arranged to receive a second reference image portion corresponding to the second image portion and to compare the second image portion to the second reference image portion.

4. An apparatus as recited in claim 3, wherein the first image portion differs from the second

image portion.

5. An apparatus as recited in claim 1, wherein the first image portion differs from the second image portion.

6. An apparatus as recited in claim 5, wherein at least a part of the first image portion is identical to at least part of the second image portion.

7. An apparatus as recited in claim 1, wherein the first processor is configured with a different algorithm for analyzing the first image portion than the second processor.

8. An apparatus as recited in claim 3, wherein the first reference image portion is derived from a corresponding portion of the sample.

9. An apparatus as recited in claim 3, wherein the first reference image portion is derived from a file used to design the sample.

10. An apparatus as recited in claim 1, wherein the first processor is arranged to receive a first reference data portion that characterizes a pattern in the sample that the first image portion corresponds to, and the first processor is also arranged to render the first reference data portion to a first reference image portion and to compare the first reference image portion to the first image portion.

11. (Amended Once) An apparatus for inspecting a plurality of image portions of at least a region of a sample, the apparatus comprising:

a plurality of distributors arranged to receive the image portions; and

a plurality of processors that are arranged into a plurality of subgroups that are each coupled to an associated distributor, each processor being configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions,

each distributor being configurable to select one or more algorithms selected from the plurality of different algorithms, output selected image portions to its associated subgroup of processors, and configure its associated processor with its selected one or more algorithms, at least two of the processors being arranged to analyze at least two of the image portions in parallel.

12. An apparatus as recited in claim 11 wherein the distributors are arranged in a daisy chain configuration such that a first distributor receives the image portions and outputs one or more of the image portions to a second distributor.

13. An apparatus as recited in claim 11 wherein each subgroup of processors includes a supervisor processor that is coupled with an associated one of the distributors so as to receive the selected image portions from the associated distributor, wherein each supervisor processor is configurable to distribute the selected image portions to selected processors within its associated subgroup.

14. An apparatus as recited in claim 11 wherein a first processor is arranged to receive a selected image portion and a selected reference image portion corresponding to the selected image portion and to compare the selected image portion to the selected reference image portion

15. An apparatus as recited in claim 11, wherein a first processor is arranged to receive a selected image portion and a reference data portion that characterizes a pattern of the sample that the selected image portion corresponds to, the first processor being further arranged to render a reference image portion from the reference data portion and to compare the reference image portion to the selected image portion.

16. An apparatus as recited in claim 14, wherein the selected reference image portion is derived from a corresponding portion of the sample.

17. An apparatus as recited in claim 15, wherein the reference data portion is derived from a file used to design the sample.

18. (Amended Once) A method of inspecting a sample having a plurality of fine patterns thereon, and processing data resulting from the inspection, comprising:

a) receiving data derived from the inspection in a multiprocessor system, the system comprising a master processor and a plurality of slave processors;

b) dividing the data into groups using the master processor, each data group corresponding to information derived from a portion of the sample, [wherein each group has a quantity of data which may be processed by a slave processor in a predetermined time interval] wherein each slave processor is configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing a one of the data groups;

c) selecting one or more algorithms from the plurality of different algorithms for each slave processor and configuring each slave processor with the selected one or more algorithms for such each slave processor;

d) processing the data groups with the slave processors based on the selected one or more algorithms for each slave processor; and

e) deriving defect information regarding the sample and the fine patterns from the combined data.

19. The method of claim 18, wherein the sample is selected from a group consisting of a reticle, a photomask, and a semiconductor material, device, or surface.

20. The method of claim 18, wherein the system comprises a plurality of master processors, each in communication with a plurality of slave processors, and wherein each of the master processors is in communication with a central processor, the central processor allocating data among the master processors.

21. The method of claim 18, wherein a first group of the slave processors uses one or more algorithms selected to process data with high accuracy, but at a relatively slow rate, and wherein a second group of the slave processors uses one or more algorithms selected to

process data with a relatively low accuracy, but at a high rate.

22. The method of claim 18, where the data groups are processed using an algorithm which compares data derived from differing regions of the sample.

23. The method of claim 18, wherein the data groups are processed using an algorithm which compares data derived from a portion of the sample with data derived from a file used to design the sample.

24. (Amended Once) A method for analyzing image data obtained from a sample using a plurality of processors, comprising the acts of:

receiving image data from an inspection system that generates the image data from a sample;

dividing the image data into a plurality of image portions that correspond to various portions of the sample;

outputting each image portion to a selected processor, at least some of the image portions going to different processors, each processor being configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing the image portions;

selecting one or more algorithms from the different algorithms of each selected processor and configuring each selected processor with its selected one or more algorithms;

analyzing each image portion for defects within the selected processor based on the selected one or more algorithms for such selected processor; and

outputting and combining results from each processor such that defect data is compiled for the entire image data.

25. A method as recited in claims 24, wherein at least some of the image portions are analyzed with different algorithms.

26. A method as recited in claims 24, wherein at least some of the image portions are analyzed

more stringently than others of the image portions.

27. A method as recited in claims 24, further comprising receiving reference data corresponding to each image portion.

28. A method as recited in claims 27, wherein each image portion is analyzed by comparing each image portion to its corresponding reference data.

29. A method as recited in claims 27, wherein the reference data is in form of a corresponding image portion of the sample.

30. A method as recited in claims 27 wherein the reference data is in form of design data that is used to construct the sample.

31. A method as recited in claims 24 further comprising receiving control data that specifies how to divide and output the image portions to their selected processors.

32. A method as recited in claims 31 wherein the control data also specifies how to analyze the image portions for defects within the selected processors.

33. A method as recited in claims 32 wherein the reference data is in form of design data that is used to construct the sample, and the control data also specifies how to render the reference data from the design data.

34. (Amended Once) A computer readable medium containing program instructions for inspecting a sample having a plurality of fine patterns thereon, and processing data resulting from the inspection, the computer readable medium comprising:

computer readable code for receiving data derived from the inspection in a multiprocessor system, the system comprising a master processor and a plurality of slave processors;

computer readable code for dividing the data into groups using the master processor, each data group corresponding to information derived from a portion of the sample, [wherein each group has a quantity of data which may be processed by a slave processor in a predetermined time interval] wherein each slave processor is configurable to implement one or more algorithms selected from a plurality of different algorithms for analyzing a one of the data groups;

computer readable code for selecting one or more algorithms from the plurality of different algorithms for each slave processor and configuring each slave processor with the selected one or more algorithms for such each slave processor;

computer readable code for processing the data groups with the slave processors based on the selected one or more algorithms for each slave processor;

computer readable code for deriving defect information regarding the sample and the fine patterns from the combined data; and

a computer readable medium for storing the computer readable codes.

35. A computer readable medium as recited in claim 34, wherein each of the plurality of master processors is in communication with the plurality of slave processors, and wherein each of the master processors is in communication with a central processor, the central processor allocating data among the master processors.

36. A computer readable medium as recited in claim 34, wherein a first group of the slave processors uses one or more algorithms selected to process data with high accuracy, but at a relatively slow rate, and wherein a second group of the slave processors uses one or more algorithms selected to process data with a relatively low accuracy, but at a high rate.

37. A computer readable medium as recited in claim 34, wherein the data groups are processed using an algorithm which compares data derived from differing regions of the sample.

38. A computer readable medium as recited in claim 34, wherein the data groups are processed using an algorithm which compares data derived from a portion of the sample with data

derived from a file used to design the sample.

39. (Amended Once) A computer readable medium containing program instructions for inspecting a sample having a plurality of fine patterns thereon, and processing data resulting from the inspection, the computer readable medium comprising:

computer readable code for receiving image data from an inspection system that generates the image data from a sample;

computer readable code for dividing the image data into a plurality of image portions that correspond to various portions of the sample;

computer readable code for outputting each image portion to a selected processor, at least some of the image portions going to different processors, each processor being configurable to implement one or more algorithms for analyzing the image portions selected from a plurality of different algorithms;

computer readable code for selecting one or more algorithms from the different algorithms of each selected processor and configuring each selected processor with its selected one or more algorithms;;

computer readable code for analyzing each image portion for defects within the selected processor based on the selected one or more algorithms for such selected processor;

computer readable code for outputting and combining results from each processor such that defect data is compiled for the entire image data; and

a computer readable medium for storing the computer readable codes.

40. A computer readable medium as recited in claims 39, wherein at least some of the image portions are analyzed more stringently than others of the image portions.

41. A computer readable medium as recited in claims 39, further comprising computer readable code for receiving reference data corresponding to each image portion.

42. A computer readable medium as recited in claims 41, wherein each image portion is analyzed by comparing each image to its corresponding reference data.

43. A computer readable medium as recited in claims 41, wherein the reference data is in form of a corresponding image portion of the sample.

44. A computer readable medium as recited in claims 41, wherein the reference data is in form of design data that is used to construct the sample.

45. A computer readable medium as recited in claims 39, further comprising computer readable code for receiving control data that specifies how to divide and output the image portions to their selected processors.

46. A computer readable medium as recited in claims 45, wherein the control data also specifies how to analyze the image portions for defects within the selected processors.

47. A method as recited in claims 46 wherein the reference data is in form of design data that is used to construct the sample, and the control data also specifies how to render the reference data from the design data.